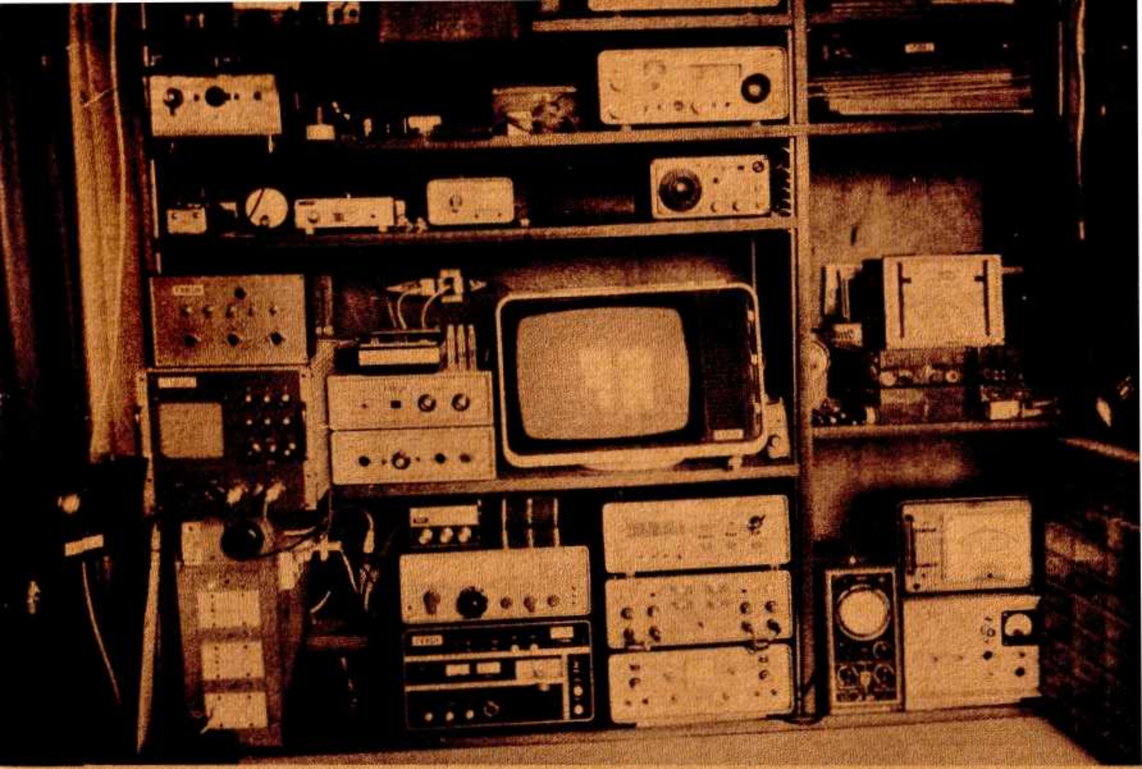

CQ — TV

THE JOURNAL OF
THE BRITISH AMATEUR
TELEVISION CLUB.

NO **90**

MAY 1975

THE BRITISH AMATEUR TELEVISION CLUB

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Letters to the Editor

Dear Sir,

I have read the letter from Mr. Trundle in the last issue of C Q - T V with great interest, as it seems that we have similar problems. However, I have found another FSS tube that is much cheaper. It is Q7-110GU tube from Telefunken, 3 inch compact tube primarily intended for domestic slide and Super 8 flying spot scanners. The tube is electrostatically focussed, 40 degree deflection and the GU phosphor has a decay time of 0.2u sec. so no corrector is necessary. And best of all- the deflection coils and socket are of the normal domestic tv receiver type.

The tube costs about 100 dollars new, but a second grade example was offered to me for approximately 40 dollars from Electron (Swiss Telefunken Representative).

I think the similar Q7-100GU from Mullard has the same performance, but I have few details about it. Perhaps Mr. Trundle will be able to get better prices from Mullard for B.A.T.C. members if it turns out to be available from them.

I found a very cheap colour picture tube, the 11SP22, intended for use in portable receivers. I obtained the deflection coils for it from the local representative of General Electric who use the tube in their "Portacolour" set. It is 70 degree deflection and although I used a convergence circuit, acceptable results are obtained without. Here is an address where it is possible to order the tube: IMRA Bildrohrenversand, 4054 Nettetal 2, Kehrstr 83, West Germany.

Thanks in advance for publishing my letter in C Q - T V.

Ing. Ladislav Vig
Alfred-Schindler-Str 3
CH-6030 Ebikon,
Switzerland.

NOTICE

The Editor has changed his address.
Please send all correspondence in future to:
The Editor C Q - T V
17 Woodside Avenue
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Surrey. KT10 8JQ

POSTBAG

CONGRATULATIONS

To our President, Bob Roberts G6NR who has just been awarded a Fellowship of the Royal Television Society. This was announced last February, and the formal presentation took place in March. The citation in the RTS bulletin read "Bob Roberts, consultant and associate lecturer at the Polytechnic of North London. He has been associated with the Polytechnic for almost 40 years. He is President of the British Amateur Television Club and a member of the IERE and many BSI and Industry committees".

Doug Laver in Boonah, Queensland, 60 miles from Brisbane, is surrounded by hills - yet in a town of 2000 there are still three lecensed amateurs. Restricted to transmitting pictures across the town, Doug finds his audience quite impressed! Perhaps one day, he says, he will call further afield on SSTV. We hope you will soon.

Henry Ruh of Box 128, Whitemore Lake, Michigan 48189, U.S.A. has just taken over editing "A5 Magazine" from Ron Cohen. He hopes to continue A5 as the great magazine Ron made it during his term, and we in C Q - T V wish him the best of luck.

Mike Cook G8HBR in Whitefield, Manchester is planning to apply soon for a /T licence - but first must build his 70 cm transmitter. He has already built a portable vidicon (some circuit details of this appear on another page of this issue) and looks like an amateur with a promising future.

David Long G6ACH/T G8PTU of 2 Yeomans Close, Catworth, Huntongdon, Cambs PE18 0PL Tel. Bythorn 391, appeals for contact with anyone interested in tv within a reasonable distance of his QTH. He has a Tx just about finished and Rx facilities for 625 line negative mod. The QTA is just about the highest spot in Huntingdonshire.

COVER PHOTO The station operated by a new member, F6BQH/T Luc Houle, near Calais in France.

AMATEUR TELEVISION CONTEST

The next Contst will be an international fast scan affair (along the lines of February's slow scan one). Full details appear on page 21 of this issue. Please support it on behalf of B.A.T.C.

IN THE NEXT CQ-TV

An Amateur Lightweight Tripod.
Part 3 of the Image Orthicon Article.
More Slow Scan Articles.

A MODIFICATION TO THE SONY TV9-90UB

Mike Crampton T.Eng(C.E.I.) A.M.I.M.I. G6AHJ'T

The object of this modification was to adapt a Sony TV9-90UB battery/mains television set for use with a video recorder, and also to enable it to be used for the reception of amateur television and DX tv. In the two last cases, negative modulation 625 signals are often found on VHF as well as UHF.

TIME BASE

To obtain 625 VHF use both front panel buttons out; for 405 VHF use both buttons in. To bring both buttons out press the one which is already out very slowly until the other releases. To get both in, press them together and evenly until they both latch "in".

MODULATION SENSE

The detector circuitry switches in an extra transistor to provide the phase reversal necessary for negative modulation. It is a simple matter to provide a switch to reverse the wires between the detectors and the original modulation switch. This enables either modulation sense to be selected. Figure 2 gives the modified circuit, which can be compared with the original in Figure 1.

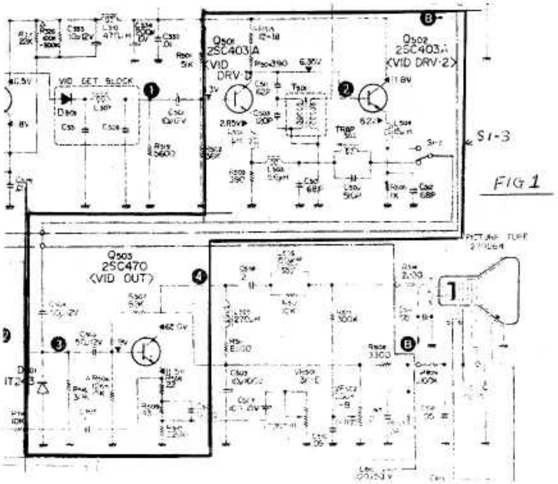
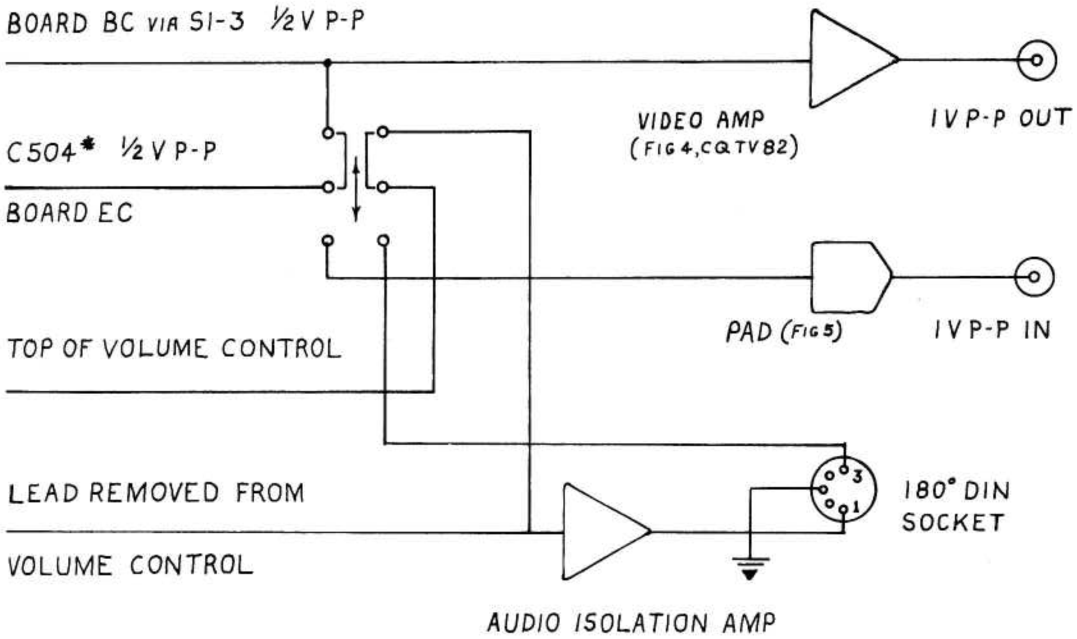


FIG 1



* ON LATER SETS C504 HAS BEEN MOVED TO BOARD BC THUS A 50μF ELECTROLETIC SHOULD BE PLACED IN SERIES WITH THIS LEAD.

FIG 3

The extra switch can be mounted on the front of the set, below the VHF tuner or the grille. The cable colours tend to vary from set to set, and so are not given here. It is suggested that a manual be obtained from Sony for further details.

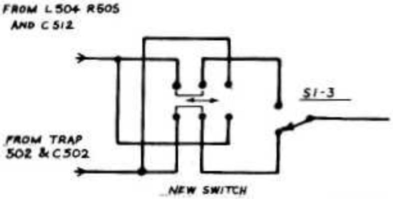


FIG 2

VIDEO INPUT AND OUTPUT

Figure 3 shows the method used to provide video input and output connections. These go to boards EF and BC and can be located as follows:
Board EF is the one with "contrast", "brilliance" and "hold" controls; on removing the case from the receiver a shield will be found over this board. Unsolder the top of this shield and pull it down.

A screened lead will be seen connected to the conductor side of the board, coming from board BC via S1-3. Remove this lead; it can be extended and an additional lead connected to board EF in its place.

An isolation amplifier had to be incorporated to raise the ½ volt level of the Sony and to prevent outside loads from interfering with the operation of the set. Searching through various circuits it was found that the one which came nearest to the requirements was the "Video Attenuator" by G6ABE/T from C Q - T V No. 82. Although the attenuator part of the circuit is not required, the amplifier brings the levels to the correct 1 volt.

The input to the original circuit is ignored and that of Figure 4 is used. If loss of syncs occurs on an outgoing signal it is probably due to excessive input to the MFC 6040, and the value of the resistors in the pad should be changed to suit.

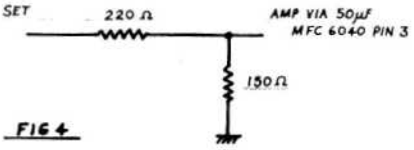


FIG 4

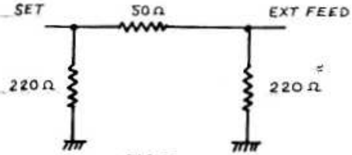


FIG 5

The original pad in the circuit is used on the video input circuit to drop the normal 1 volt p to p down to ½ volt; this is inserted into the set as shown in Figure 5.

A small diecast box is used to hold the unit, with the switch mounted on the front. This box can be fitted anywhere on the case of the set, as convenient. This may be the back, as done by Sony on their VTR capable sets, on the side with the switch towards the front.

AUDIO

Any small audio amplifier can be used to isolate the audio output. A unit with a high intput impedance should be chosen, so as not to load the set unduly.

AN I.C. SCAN FAILURE PROTECTION CIRCUIT

M.K. Cook B.Sc. G8HBR

Whilst constructing a transistor vidicon camera to run off a 12 volt D.C. supply the following scan failure protection circuit was developed. In the camera the line drive pulse from a TTL SPG feeds an invertor to produce the HT for the vidicon and in the event of a scan failure these pulses are stopped.

The scan failure protection circuit is shown in Figure 1, for line and frame failure two of these are required. A one ohm resistor monitors the current through the scan coil and Tr 1 amplifies this to produce a negative pulse every scan. The I.C. is a NE 555 timer and is connected so that the pulses from Tr 1 will discharge the timing capacitor C_2 via Tr 2, before the threshold voltage is reached. If this voltage is reached, due to a missing pulse from Tr 1 through scan failure, the output at pin 3 drops from high to low.

The time taken to reach the threshold voltage is given by $T = 0.693\ R\ C_2$ and should be set slightly longer than the time between scans. The values shown are for a 625 line system. The NE 555 timer can be used with any supply voltage from 4.5 to 18 volts; with a 5 volt supply the output is TTL compatible, this being required for my application.

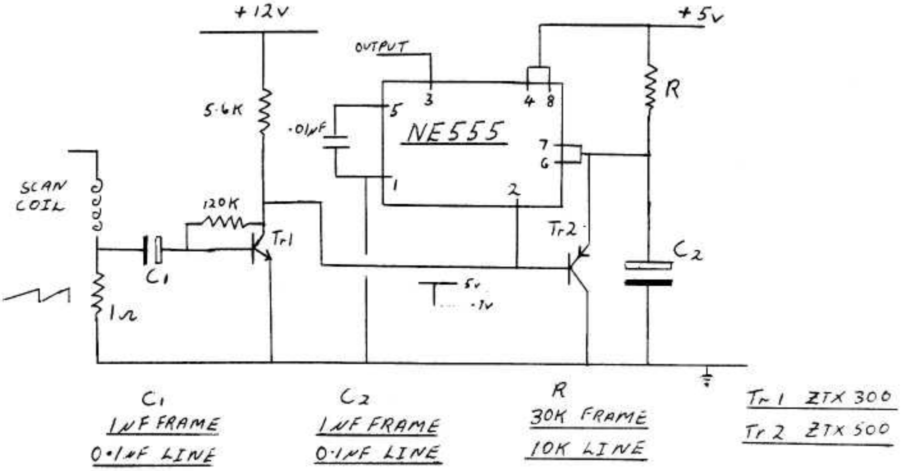


FIGURE 1 SCAN FAILURE PROTECTION CIRCUIT

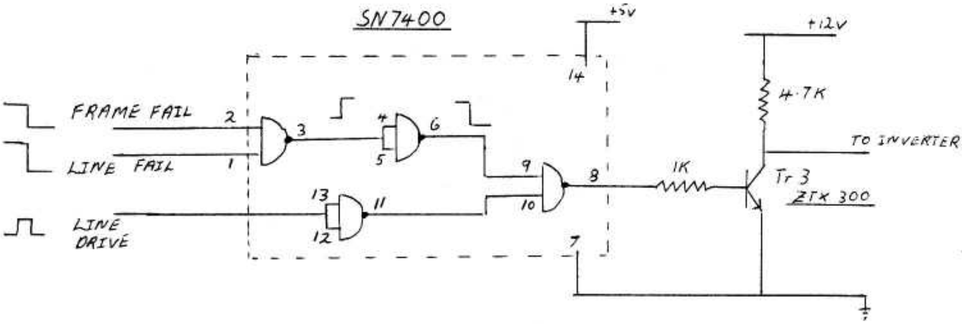


FIGURE 2 LINE AND FRAME MIXING

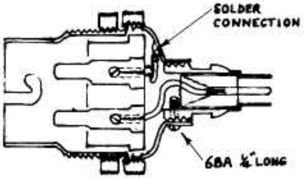
The outputs from two of these circuits are mixed (see Figure 2) using a SN 7400 I.C. and then added to the line drive pulses. If the frame or line inputs drop too low then no line pulse will appear at the collector of Tr 3.

These protection circuits could be used to turn off the vidicon by driving the cathode about 40 volts positive, if this voltage is conveniently available in the camera. During the development of the camera, these circuits saved the vidicon seversl times, from the effects of broken wires and carelessness.

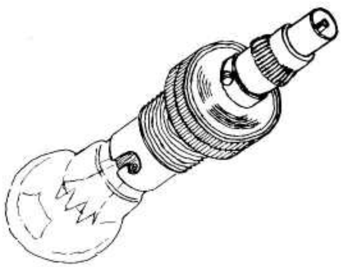
A COAX LAMP LOAD ADAPTOR

R. Cooke G3DOX

This simple unit is a "coax to lamp" load adaptor using easy to get parts. It plugs directly into the output socket of the Transmitter and enables a standard electric light bulbs to be plugged in as a dummy load. A lamp of the correct wattage to suit the Transmitter's output should be chosen.



CROSS SECTION VIEW OF DUMMY LOAD



BULB, HOLDER, & BELLING LEE PLUG

Parts List

1 ½ inch Brass lampholder
1 Belling-Lee coax plug
1 ¼ inch 6B.A. bolt

AN IMAGE ORTHICON CAMERA

P. Hayes

PART 2

Fig. 7 shows the field scan generator. A surprising amount of scanning power is required by an image-orthicon; approaching the amount required by a 12" to 14" CRT. Referring to Fig. 7, Q1 is a unijunction sawtooth oscillator. Differentiated field drive is fed to B1 and triggers the discharge of the 2uf capacitor, C1. C1 then charges up through Q7, the rate of charging being controlled by the voltage on the base of Q7. Emitter follwer Q2 isolates Q1 from the amplifier stages, Q3-4. Q5 is the output stage, and a measure of the output waveform is obtained across the emitter resistor. This is amplified by Q6 and used to control Q7, the charging circuit for C1. The amount of "bootstrapping" thus obtained is set by the 200 Ω control in the emitter of Q5, and adjusts the scan linearity. The height control in the emitter of Q2 also affects linearity so this latter control should be adjusted first. Some variation in scan size with heating of the scan coils does occur; This could be reduced by placing a thermistor in parallel with the coils. The maximum output that can be obtained from this circuit is over twice that required to fully scan the target, but requires a well stabilised power supply. Experiments are being undertaken to reduce this requirement, mainly centering around feeding back dc voltage proportional to scan output to the height control in such a way as to stabilize scan amplitude.

This field scan circuit gives enough power to drive the scan coil of a 5 inch view finder. The feed taken from the collector of the 2N3055 output transistor to the I.O. coils should be taken through the viewfinder scan coil then through a 500uf 500vw capacitor to earth. Across the viewfinder coil wire a 22 ohm 1 watt resistor in series with a 25 ohm variable to act as a height control. Varying this control has less than 5% effect on the I.O. scan power. Shift volts are applied to the "cold" end of the I.O. coils.

The line scan circuit produces many problems. Various circuits were tried with little success, and many burnt out ransistors! Thyristors were also tried, also unsuccessfully. Finally I decided to use valves in the output and driver stages. The circuit is that used in the Marconi cameras, with modifications to the early stages to use transistors, and is shown in Fig. 8. Q1 and 2 serve to clean up the line drive input, and Q3-4 amplify it up to about 45v p-p. The amount fed to V1 is set by the line drive control. Feedback from line output transformer is not essential, but linearity is improved by its inclusion. It is possible to replace the efficiency diode by 6 IN4007 silicon power diodes. 1 M5 resistors should be placed in parallel with each to balance the load evenly betweenthem. Most line output transformers will work to some extent and will match into most IO coils. A guide to the construction of scanning coils is given later.

The IO tube requires EHT supplies of +1500v for the dynode chain, and -700v for the image section. A small amount of line scan output is fed to V5, and the EHT is developed across the ringing coil in its anode.

Severe damage can occur to the IO tube if either or both scans should fail. Some form of protection must therefore be included preferably of a "fail safe" nature. Fig. 9 shows a suitable circuit. Q1-2 form a schmitt trigger producing no output unless the input rises above a certain threshold level, set by the sensitivity control. Q3-4 is identical, and the combined output is rectified by D3. The dc voltage is amplified by Q5, and used to hold off the third schmitt trigger made up of Q6-7. Relay RLY2 in the collector of Q7 is thus energised only when both scans are present. Failure of most components, the relay, or the power supply to the protection circuit will stop the IO tube operating thus giving a measure of "fail safe".

Fig. 10 gives the circuit of the 300v power supply, and the focus current stabiliser. The HT supply does not require stabilisation as the line scan amplifier is relatively unaffected by HT supply variations, and the focus supply has to be current stabilised. The IO tube requires an axial magnetic field strength of 120 gauss for the image section and 70 gauss for the scanning section ($4\frac{1}{2}$" tube). With the standard focus coils used by camera manufacturers and available to amateurs, a focus current of125ma is required. This current must be stabilised or beam and image focus will vary considerably as the focus coil warms up. It is not good enough to stabilise the voltage across the coil as the current will fall when the coil heats up and its resistance rises. In fig 10, the current is stabilised by measuring the voltage across a resistor in series with the coil, and arranging for this to be kept constant. The voltage across the resistor (100Ω) should be 12.5v for the correct focus current to be flowing, and a proportion

NOW AVAILABLE THROUGH B.A.T.C.

SLOW SCAN TELEVISION HANDBOOK

By Don C. Miller W9NTP
Ralph Taggart WB8DQT

This book, a '73' publication, contains 248 pages full of information of every aspect of this rapidly growing brand of Amateur Television. There are eleven chapters ranging from the history of SSTV to colour SSTV. There are chapters on Monitors, Cameras, Flying Spot Scanners with many illustrations and circuits varying from the very simple to the more sophisticated including the use of up-to-date integrated circuit techniques.

The book is well written with detailed explanations of circuits and techniques enabling the beginner to quickly understand the principles behind SSTV.

Price £2.00 plus 20p post and package.

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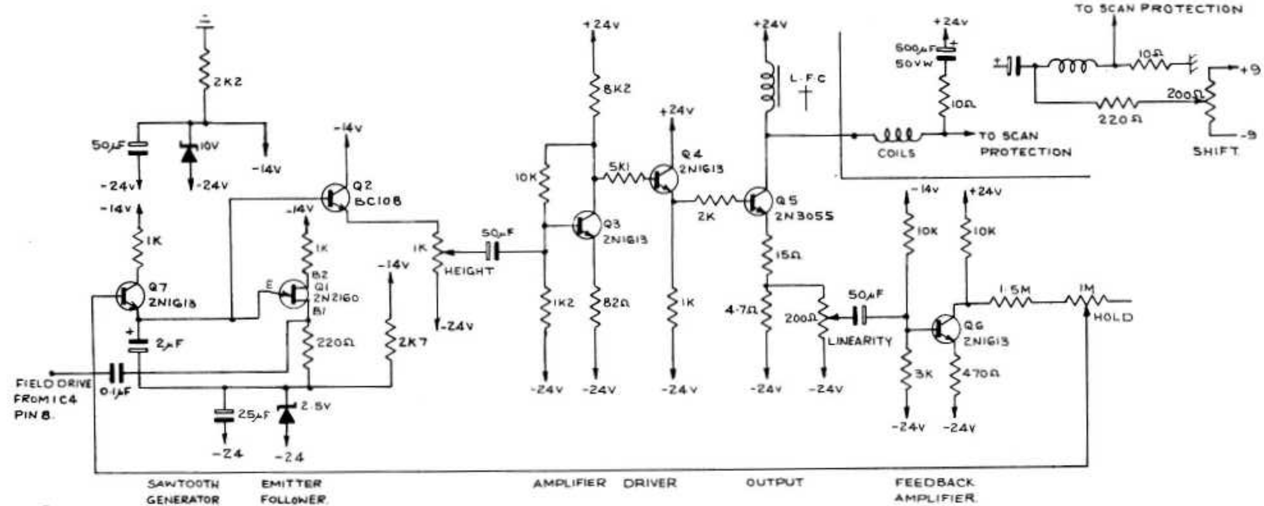
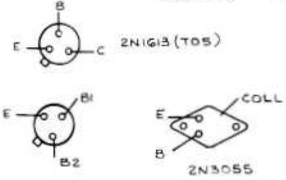




† N.B. USE SMALL T.V. SMOOTHING CHOKE

FIG. 7 FIELD SCAN CIRCUIT

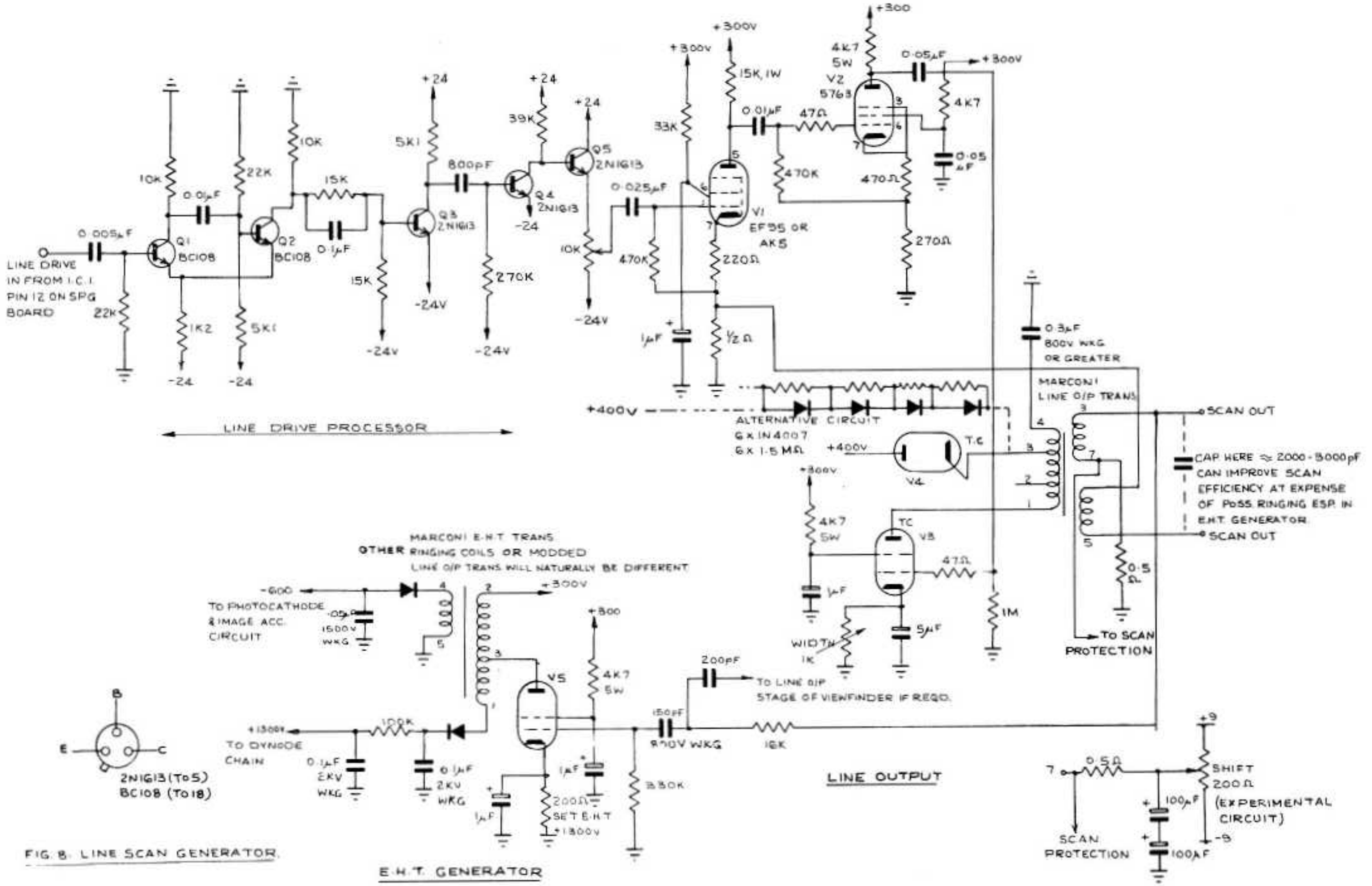


FIG. 8. LINE SCAN GENERATOR.

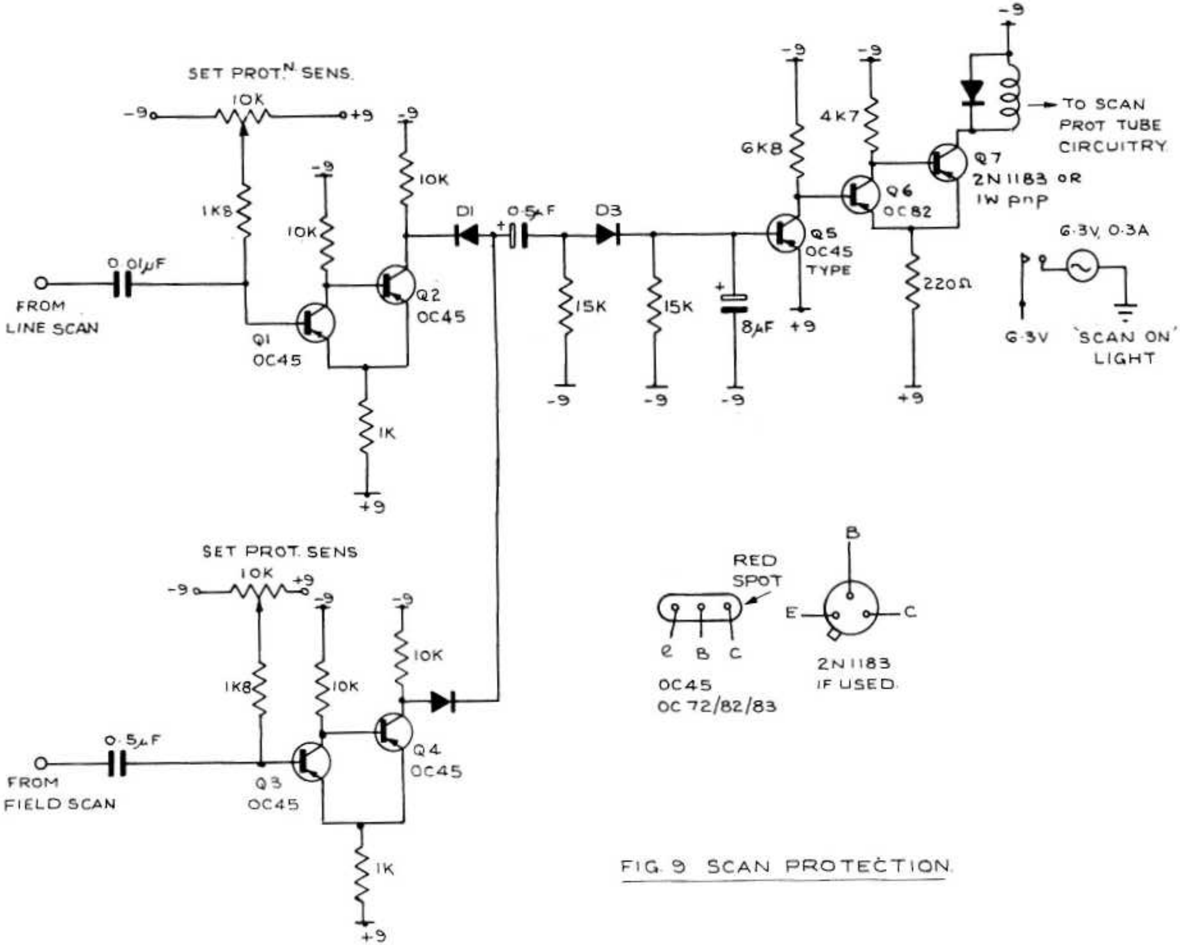


FIG. 9 SCAN PROTECTION.

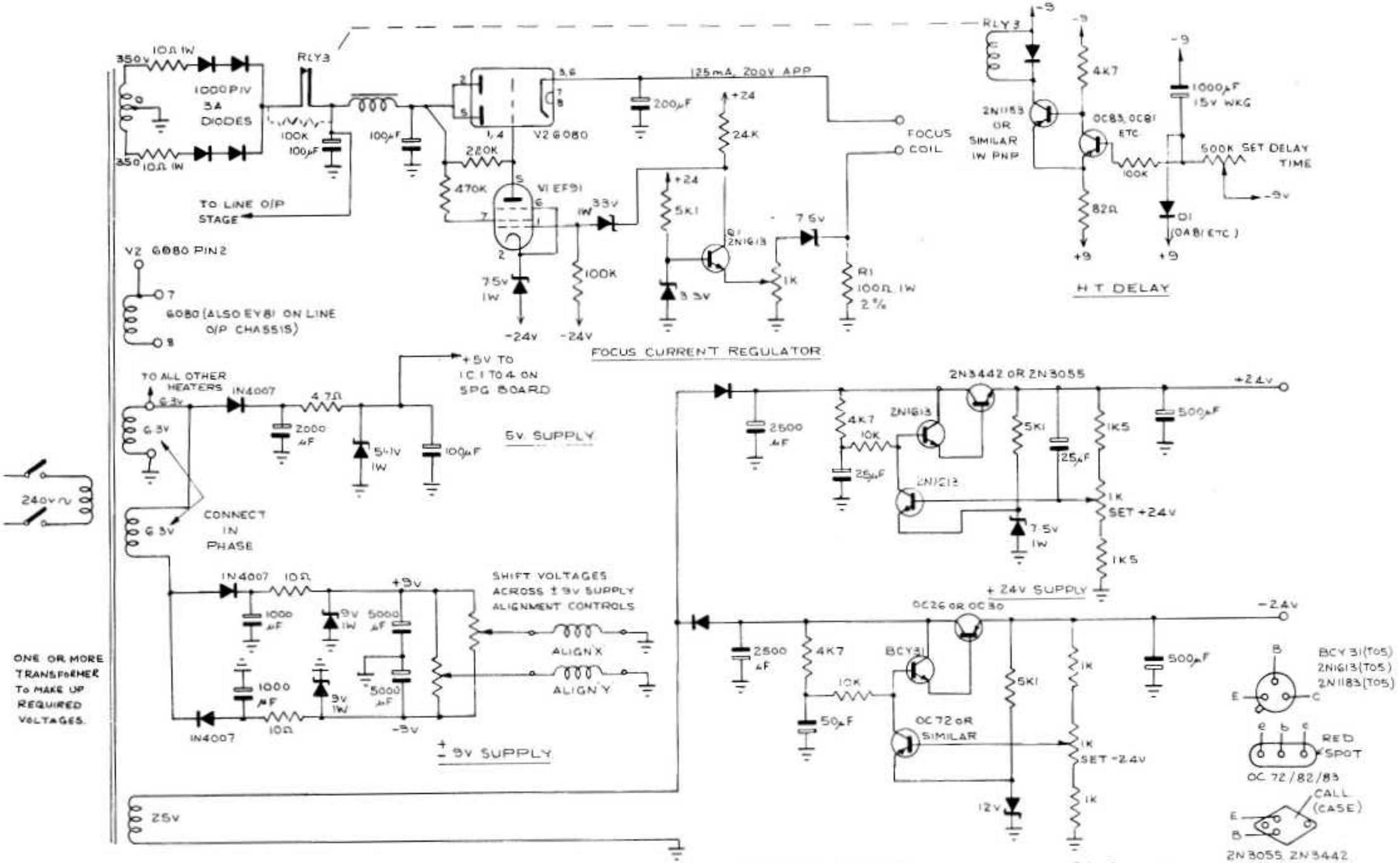


FIG 10. POWER SUPPLY

is tapped off and fed to the emitter of Q1. The base of Q1 is fixed at 3.3v by a Zener diode. Thus any difference between the base and emitter will cause Q1 to conduct (assuming the base is more positive). The amplified error is fed to V**1**, and after further amplification, used to control V2, the series stabiliser. A 6080, with both triode sections connected in parallel, can handle 125ma. By varying the amount tapped off the 100 Ω the focus current can be set. The two Zener diodes in the signal path serve to step down the standing dc voltage without losing"signal" level.

Also included in Fig. 10 is a simple stabilised -150v supply for the beam current circuit. An HT delay circuit is also included; this consists of a schmitt trigger driven from a capacitor charging through a resistor. When the voltage reaches the triggering point of the schmitt trigger, Q1 ceases to conduct, Q2 conducts and the relay contacts close. Should a supply failure occur, the voltages on the +9 and -9 lines fall to zero, and a very low resistance appears between the lines (the two 200 alignment pots are across the lines). Therefore the cathode of D10 is effectively connected to the negative terminal of the timing capacitor, and, as the anode is already connected to the positive terminal, the capacitor is rapidly discharged. This protects the high voltage circuits from sudden surges.

The low voltage power supply is very conventional, the only unusual feature is the half wave voltage doubling rectifier. If a centre tapped 50v transformer were available, a full wave circuit could be used. Three transistors are used to amplify the difference between a reference voltage and a proportion of the output voltage.

The camera can be constructed in a number of different ways. However, a number of points should be borne in mind. For example, place the power transformer as far away from the tube as possible to reduce hum pickup. Decide on the method of optical focussing to be used; commercial scanning yokes will almost certainly have some method of moving the carriage on some form of runner. If a home-made yoke is used it may be easier to effect focus by adjusting the lens itself (it should be noted that ordinary photographic 35mm lenses will give perfectly adequate results although lenses computed for television work will naturally give better results). Other points worthy of note include keeping the line scan chassis well away from the signal chassis and ensure that the camera is solidly constructed. I built the frame out of 1ins aluminium alloy "angle" mounted on a baseplate made of $\frac{1}{8}$ ins. alloy, and I have had no trouble mechanically. The head-amp (emiiter follower) and pre-amp were built in small diecast boxes mounted in a large box, together with the tube base components. Care should be taken to avoid earth loops, as in any low level amplifier. Failure to do so can result in ringing and even oscillation. Other precautions are mainly common sense, and will be obvious to anyone capable of constructing an Image Orthicon camera.

For the benefit of anyone who may be using an IO for the first time I shall give a "run down" on how best to obtain a picture. Before installing the tube check that the voltages on the tube base are about those indicated on the circuit diagram. Also check the voltages going into the five pin image section connector, especially the target voltage. Placing a screwdriver on the base of Q1 in the head amp should produce heavy patterning on the monitor screen. Ensure the scans are present and the scan protection relay is energised. Adjust the scan amplitude for maximum scans, and adjust the alignment and shift controls to mid range. If all is well, switch off, place the tube in the camera, and switch on. After the HT has come on, adjust the lift control until a "grey" level appears, and advance the gain to mid range. Turn up the beam current (coarse, if fitted) until some evidence of beam is seen. By adjusting Beam, Image and Dynode (ortho or persuader) Focus, and optical focus, a reasonably good picture should be obtained. Alingment controls are adjusted as in a vidicon, i.e. for minimum movement of picture at centre of frame when adjusting beam focus. Alignment control settings have a considerable effect on shading as well as resolution, patterning etc. The accelerator and decelerator controls are adjusted for best picutre geometry, in particular straightness of horizontal and vertical lines, and shading signals. Scans are set as in a vidicon. i.e. just avoiding corner cutting: after setting the scans the two scan protection sensitivity controls are set so that any appreciable reduction in amplitude of either scan will cause the relay to trip out. Several settings of the Beam Focus control will produce beam focus (unlike a vidicon where only one "node" occurs); a node near mid-range should prove satisfactory. Image Focus can also give more than one node; provided the picture is satisfactory use the node nearest the high potential end as this will give the maximum accelerating potential and therefore the maximum (noise free) image gain. I found that correct setting up gave very little shading, si I decided not to include shading correctors. Exposure is adjusted to give maximum output consistant with minimum "throw off" i.e. black "halos" around highlights. When the tube is correctly exposed the beam current is reduced to the point at which beam limiting occurs and then advanced a very little. Excessive use of beam will result in a poor signal to noise ratio as unused beam finding its way into the dynode chain, and thus into the signal system, appears as noise.

To be continued in the next issue of C Q - T V.

FROM C Q - T V MARCH 1951

MAR 51 "As members are aware an import licence is required for the import of 5527's. In order to save time and trouble, R.C.A.'s London office applied for permission to import 20 of these tubes at once, but their application was turned down by the Board of Trade. However, the BoT state that they will grant individual licences where "documentary evidence to the effect that genuine research work is being undertaken and that alternative U.K. tubes are either not available or are unsuitable is provided. To date, the BoT have not refused any application by an amateur, although the exact nature of the documentary proof required is in doubt! If members of B.A.T.C. would like a certificate of accredited membership of this Club, the Editor would be happy to oblige." (Ed. Thank goodness things are a little easier now!)

CIRCUIT NOTEBOOK No 21

J. Lawrence GW6JGA'T

MOTOR CONTROL CIRCUITS

Looking through the last couple of issues of C Q - T V there appears to be an increasing interest in FAX and Low Definition TV, both employing mechanical scanning and requiring precision control of motor speed. This edition of Circuit Notebook includes a simple circuit and references on the subject.

The circuit shown in Figure 1 was used successfully to drive a colour drum in a field sequential colour monitor. It uses a small universal series motor (typical of the type used in spin driers) with the armature and field connections separated, and brought out separately.

The armature is current fed with rectified a.c., the series impedance being provided by a switchable bank of capacitors.This avoids the dissipation loss associated with the more usual series resistor. The actual values of capacitors may have to be chosen to suit the motor. Electrolytic capacitors are not suitable in this application.

The field coils are used for controlling the speed of the motor and these are supplied with current from a Darlington pair, in the form of transistors VT3 and VT4.

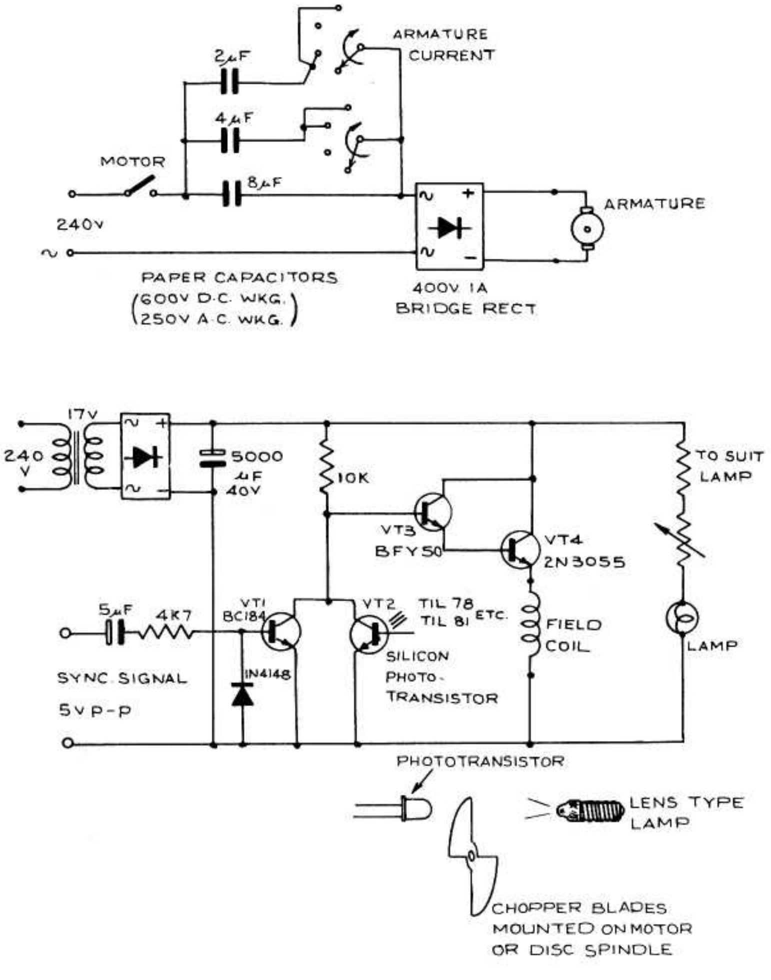
VT1 and the phototransistor VT2 form a phase comparator. Synchronising signals are fed to VT1 while VT2 is operated by a beam of light which is interrupted by a chopper blade mounted on the shaft of the disc or drum.

The relative phasing of the chopping frequency and synchronising signal define the average current fed through VT3 and VT4 to the field winding and thus the motor speed.

OPERATION

In operation the lamp series is set for sufficient illumination to saturate the photo-transistor, but at less than maximum brilliance to give a reasonable lamp life.

FIG. 1. DRIVE SYSTEM USING 'SPIN DRYER' MOTOR



To set up the system, the lamp series resistor is set to maximum resistance (min. illumination) and the motor speed is allowed to build up to near the synchronous speed. At this point the lamp resistor is set to its normal position and the motor should "lock-in".

Too little armature current may not provide sufficient power for the motor to reach the required speed, too much will cause speed instability and hunting.

When the motor is locked-in the lamp series resistor may be adjusted slightly to give a small control of relative phase.

For smaller permanent magnet motors, typically the 12 or 24 volt surplus type, the output of the field control circuit may be connected directly to the armature and the original armature supply omitted completely.

Of the references given, No. 4 is probably the most appropriate as the other references cover motor speed control where phase locking is not required. However, they do contain some useful ideas for general motor control.

References

1. Electronic Speed Control for Appliance Motors.
AN-482 Motorola 5.p.
2. Pulse-width Modulation for D.C. Motor Speed Control
AN-445 Motorola 5.p.
3. Applications of Photo-transistors in Electro-optic Systems.
AN-508 Motorola 5.p.

Above are available from:-
Semicomps Ltd., No.5 Northfield Industrial Estate,
Beresford Avenue, Wembley, Middlesex HAO 1SD
4. Precision Control of Motor Speed with Phase-locked loops.
A.W. Moore. Motorola "Semiconductors" Magazine 1974 No. 3 Page 20. From:-

Motorola Semiconductors Ltd., York House, Empire Way, Wembley, Middlesex.
5. Motor Control Circuit for a Tape Recorder.
Wolfgang Sodtke. Free from:-
Texas Instruments Ltd., Publication Dept., Manton Lane, Bedford.

INTERNATIONAL ATV CONTEST

Organised by A.G.A.F. A.T.A. B.A.T.C.

1975

RULES

1) Period Session 1 Saturday 13th September 1900 - 2300 GMT
Session 2 Sunday 14th September 0800 - 1200 GMT

2) Eligible Entrants: All amateurs licensed for transmitting and/or receiving amateur tv.

3) Sections and Scoring

a) Fixed and /A stations transmitting sound and vision

i) s &v tx & rx on 435 MHz (sound also on 144) 2 points/km.
ii) s & v tx & rx on 1250 MHz (sound also on 432 or 144) 8 points/km.
iii) s & v tx on 435 MHz but received on 1250 MHz (sound also on 144) 4 points /km.
iv) s & v tx on 1250 MHz but received on 435 MHz (sound may also be received on 144) 6 points/km.

If the picture is received at one QSO partner only, the points scored will be halved.

b) Portable s & v scoring as above.

c) Receiving sound or vision without confirmation;

i) receiving picture on 435 MHz 2 points/km.
ii) receiving picture on 1250 MHz 4 points/km.

4) Exchanges and Log Data Sections 3a and 3b may be stations contacted once only in each session.

Exchanges shall consist of a Callsign; vision signal report;serial number; QTH; QTH Locator; code group. (Serial numbers shall start at 001 and increase by 1 per contact through the entire contest. Code groups shall consist of four non consecutive numbers. This code group must be changed for each session, eg 8471 in session 1 and 1529 in session 2.)

Log data shall consist of Section; callsign; name; address; QTH Locator;code group used in session 1; code group used in session 2; total score; best contact with distance; remarks; date and time in GMT; station worked and callsign; report sent; serial number sent; report recorded; serial number recorded; code group recorded; QTH and QTH Locator received; frequency band received on; points/km, distance in km., and score claimed for each contact.

Each station may be listed once only in each session.

All sections must be exchanges in A5. Incomplete exchanges should be claimed and will be allowed at the discretion of the adjudicators. Logs must be postmarked not later than 30th Sept. 1975.

The Adjudicators' addresses are;

Smet Jon ON5EX
A.T.A.
Acacialaan 27
B 9720 DE PINTE
BELGIUM

for Benelux and France

Geoff Smith
4 Monks Close
Dunstable
Bedfordshire
U. K.

for Great Britain and Scandinavia

Herman Hiltenkamp
IATV Contest
Auswerter D 5982
Neuevrade-Kuentrop
Amselweg 5
Germany

for Germany

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Part 2

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